Use of AE and D_{ST} Indices to Form a Predictive Model of Geomagnetic Activity During the Declining Phase of the Solar cycle

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We find that although corotating stream-slow stream interactions cause large |B|~ 15-25 nT (hourly average field) compressional magnetic fields, the variability of the B_z component prevents long duration B_s events and thus magnetic storms with $D_{ST} \leq -100$ nT. In 1974, all three intense storms were associated with impulsive events and not corotating streams. The interplanetary events had moderate velocities, had solar sources located close to HCS and had no obvious solar visible or x-ray features. The intense Alfvén wave trains (and their B_z fluctuations) within the corotating streams caused intense and extremely long lasting HILDCAAs. "I'he existence of two of these streams and their Alfvén wave trains caused the 1974 AE index to be anomalously high (283 nT), even higher than for 1979, a year of solar maximum which was dominated by many major magnetic storms. We will show that reverse shocks present in the corotating streams can cause the onset of storm recovery phases. The causes of recurrent geomagnetic quiet and positive D_{ST} will bc discussed. In summary, a predictive model of geomagnetic activity during the declining phase of the solar cycle will be presented.

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